

1. An interferometer for use in an OCDR or OCT imaging system to image a sample, comprising:
 - a low coherence optical radiation source;
 - a first beamsplitter having a first input connected to receive optical radiation from the low coherence optical radiation source;
 - a single nonreciprocal optical element, said nonreciprocal optical element having a first input connected to receive optical radiation from a first output of the first beamsplitter, a first output for directing optical radiation from the first input to a sample to be imaged, a second input connected in common with the first output for receiving optical radiation reflected by the sample, and a second output for receiving optical radiation from the second input;
 - a second beamsplitter having a first input connected to receive optical radiation from the second output of the nonreciprocal optical element; and
 - an optical radiation detector connected to receive optical radiation from the second beamsplitter.
2. The interferometer of claim 1, further comprising:
 - a transmissive delay element having an input connected to receive optical radiation from a second output of the first beamsplitter, and an output connected to a second input of the second beamsplitter.
3. The interferometer of claim 1, wherein a second output of the first beamsplitter is connected for directing optical radiation onto a reference delay element and for receiving optical radiation reflected from the reference delay element, a second input of the first beamsplitter connected for directing optical radiation to a second input of the second beamsplitter.
4. The interferometer of claim 1, wherein the optical radiation detector comprises first and second optical radiation detectors, the first optical radiation detector connected to receive optical radiation from the first output of the second beamsplitter and the second optical

radiation detector connected to receive optical radiation from a second output of the second beamsplitter.

5. The interferometer of claim 4, wherein the first optical radiation detector and second optical radiation detector are connected to form a differential detector.

6. The interferometer of claim 1, wherein the first beamsplitter is an unbalanced beamsplitter which delivers at least 85% of the optical radiation received at the first input to the first output.

7. The interferometer of claim 1 wherein the nonreciprocal optical element comprises an optical circulator.

8. The interferometer of claim 7, wherein the optical circulator comprises a Faraday rotator and a polarizing beamsplitter.

9. The interferometer of claim 1, wherein at least one of the first and second beamsplitters is an unbalanced beamsplitter.

10. The interferometer of claim 1, wherein the optical radiation detector comprises a first optical radiation detector connected to receive optical radiation from a first output of the second beamsplitter and a second optical radiation detector connected to receive optical radiation from a second output of the beamsplitter.

11. The interferometer of claim 10, wherein the first optical radiation detector and second optical radiation detector are connected to form a differential optical radiation detector.

12. The interferometer of claim 1, wherein the first beamsplitter has a second output providing optical radiation in a path leading to the optical radiation detector via a reference arm, and wherein the optical path excludes a nonreciprocal optical element.

13. The interferometer of claim 12, wherein the optical radiation in the reference arm is in a range for shot-noise limited detection.

14. The interferometer of claim 13, wherein the reference arm includes at least one of a reflective reference and a transmissive delay line.

15. An interferometer system for imaging a sample at a sample location, comprising:

an optical radiation source, a first beamsplitter, an optical circulator and an optical detector; a first optical path extending from the optical radiation source, through the first beamsplitter, through a first portion of the first optical circulator to a sample location, and from the sample location through a second portion of the optical circulator to the optical detector.

16. The interferometer of claim 15, further comprising:
a second beamsplitter positioned between the optical circulator and the optical detector along the first optical path.

17. The interferometer of claim 16, further comprising:
a second optical path extending from the optical radiation source, through a transmissive delay element, through the second beamsplitter to the optical detector.

18. The interferometer of claim 16, further comprising:

a second optical path extending from the optical radiation source, to a reference location, from the reference location through the first and second beamplitters to the optical detector.

19. An interferometer for use in an OCDR or OCT imaging system to image a sample, comprising:

a low coherence optical radiation source;

a first beamsplitter having a first input connected to receive optical radiation from the low coherence optical radiation source;

said first beamsplitter having a first output for providing optical radiation from the first input to a sample to be imaged, and a second output for providing optical radiation in a reference arm including a nonreciprocal optical element and a reference element;

a second beamsplitter having a first input connected to receive optical radiation transmitted by the sample and a second input connected to receive optical radiation from the reference arm via the nonreciprocal optical element; and

an optical radiation detector connected to receive optical radiation from the second beamsplitter.

20. An interferometer for use in an OCDR or OCT imaging system to image a sample, comprising:

a low coherence optical radiation source;

a first beamsplitter having a first input connected to receive optical radiation from the low coherence optical radiation source;

said first beamsplitter having a first output for providing optical radiation from the first input to a sample to be imaged, and a second output for providing optical radiation in a reference arm including a transmissive delay line;

a second beamsplitter having a first input connected to receive optical radiation transmitted by the sample and a second input connected to receive optical radiation from the reference arm via the nonreciprocal optical element; and

an optical radiation detector connected to receive optical radiation from the second beamsplitter.

21. An interferometer system for imaging a sample at a sample location, comprising:

an optical radiation source, a first beam splitter connected between the optical radiation source and a sample location for transmitting optical radiation from the optical radiation source to the sample location and for transmitting optical radiation to a reference arm;

a second beamsplitter for receiving optical radiation transmitted by the sample and directing at least some of such optical radiation to an optical detector;

the reference arm including an optical circulator and a reference element; and

the second beamsplitter directing at least some of the optical radiation from the reference arm to the optical detector.

22. An interferometer system for imaging a sample at a sample location, comprising:

an optical radiation source, a first beam splitter connected between the optical radiation source and a sample location for transmitting optical radiation from the optical radiation source to the sample location and for transmitting optical radiation to a reference arm;

a second beamsplitter for receiving optical radiation transmitted by the sample and directing at least some of such optical radiation to an optical detector;

the reference arm including a transmissive delay line; and

the second beamsplitter directing at least some of the optical radiation from the reference arm to the optical detector.